



RGP – RANKERS GENIUS PROGRAM

(Phase - 02)

(Physics, Chemistry and Mathematics)

Set

A

Time: 1 Hour

Moving to 12th (JEE)

Marks: 120

1. General Instructions:

(Paper Code: 1201)

- * This test paper consists of 30 question in 3 section (A, B, C)

Marking Scheme:

- ✓ Full marks: + 4 if answered correctly.
- ✓ Zero marks: 0 if not attempted or incorrect.

2. RGP College Grant Criteria:

- ✓ Students must score a minimum of 70% positive marks in RGP.
- ✓ Student must get under AIR 5,000 in JEE/NEET Examination.

3. Cash Reward Criteria:

- ✓ Exciting Cash Rewards for RGP Toppers.

SENIOR WING (Student's Moving to Class XI th , XII th , Dropper JEE /NEET)	JUNIOR WING (Student's Moving to Class IX th & X th)
Overall 1 st Topper	Overall 1 st Topper
₹ 21,000/-	₹ 5,100/-
Overall 2 nd Topper	Overall 2 nd Topper
₹ 11,000/-	₹ 3,100/-
Overall 3 rd Topper	Overall 3 rd Topper
₹ 5,100/-	₹ 2,100/-
Overall 4 th – 8 th Topper	Overall 4 th – 8 th Topper
₹ 2,100/-	₹ 1,100/-
Overall 9 th – 15 th Topper	Overall 9 th – 15 th Topper
₹ 1,100/-	₹ 500/-

- ✓ Candidate who got 1st Rank in junior or senior wing in RGP (Phase – 01) will not be eligible for any cash Reward in RGP (Phase – 02).

** Rankings from 1 to 20 are determined based on the specific criteria outlined in the FAQ section of our website, www.myrankers.com.

4. Scholarship Criteria in Rankers Offline Classroom Program:

- ✓ 100% Fee Waiver – Student Scoring 90% and Above
- ✓ 80% Fee Waiver – Student Scoring 85% to 89.999%
- ✓ 60% Fee Waiver – Student Scoring 75% to 84.999%
- ✓ 50% Fee Waiver – Student Scoring 70% to 74.999%
- ✓ 40% Fee Waiver – Student Scoring 60% to 69.999%
- ✓ 20% Fee Waiver – Student Scoring 40 % to 59.999%
- ✓ 10% Fee Waiver – Student Scoring 30% to 39.999%
- ✓ 5% Fee Waiver – All the Aspirants Appearing in RGP

RGP RESULT & REWARD CEREMONY

Result Date: 26th March 2025

Check Your Result at: www.myrankers.com

Reward Ceremony Date: 27th March 2025

Student's Name: -

Physics (Section – A)

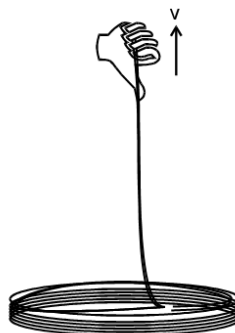
1. A uniform rope of linear mass density λ and length ℓ is coiled on a smooth horizontal surface. One end is pulled up with constant velocity v . Then find instantaneous force as a function of pulled length x .

(A) $\lambda gx + \lambda v^2$

(B) $\lambda gx - \lambda v^2$

(C) λgx

(D) λv^2



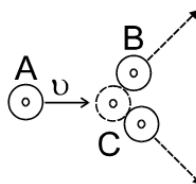
2. Three identical discs A, B, and C as shown in figure rest on a smooth horizontal plane. The disc A is set in motion with velocity v after which it experiences an elastic collision simultaneously with discs B and C. The distance between the centres of the latter discs prior to the collision is $\sqrt{3}$ times the diameter of each disc. Find the velocity of the disc A after the collision.

(A) v

(B) $\frac{v}{2}$

(C) $\frac{2v}{3}$

(D) $\frac{v}{3}$



----- Rough Work -----

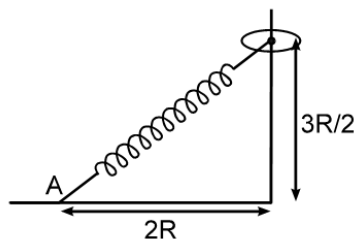
3. A ring of mass 'm' can slide along a fixed smooth vertical rod as shown in fig. The ring is connected by a spring of spring constant $k = \frac{4mg}{R}$ where $2R$ is the natural length of spring. The other end of spring is fixed to the ground at point A at a horizontal distance of $2R$ from the base of the rod. If the ring is released from a height of $3R/2$. Then it will reach the ground with a speed.

(A) $\sqrt{gR}$

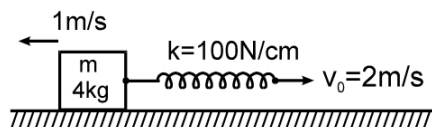
(B) $\sqrt{2gR}$

(C) $2\sqrt{gR}$

(D) $\sqrt{3gR}$



4. The spring block system lies on a smooth horizontal surface. The free end of the spring is being pulled towards right with constant speed $v_0 = 2\text{m/s}$. At $t = 0$ sec, the spring of constant $k = 100\text{ N/cm}$ is unstretched and the block has a speed 1m/s to left. The maximum extension of the spring is



(A) 2 cm

(B) 4 cm

(C) 6 cm

(D) 8 cm

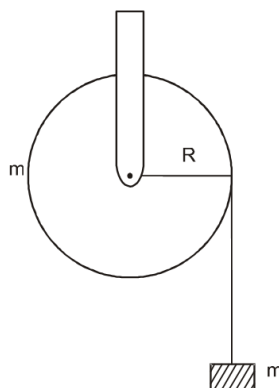
5. A mass 'm' supported by a massless string wound around a uniform hollow cylinder of mass m and radius R. If the string does not slip on the cylinder, with what acceleration will the mass fall on release

(A) $\frac{2g}{3}$

(B) $\frac{g}{2}$

(C) $\frac{5g}{6}$

(D) g



----- Rough Work -----

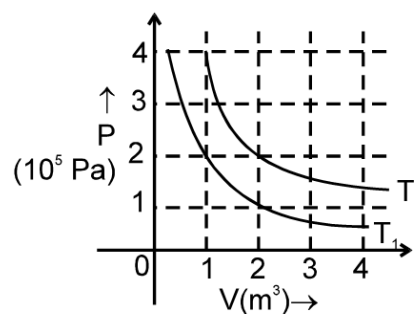
6. The following graph shows two isotherms for a fixed mass of an ideal gas. Find the ratio of r.m.s. speed of the molecules at temperatures T_1 and T_2 ?

(A) $1 : \sqrt{2}$

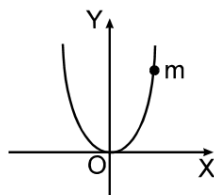
(B) $1 : 2$

(C) $\sqrt{2} : 1$

(D) $2 : 1$



7. A bead of mass m is located on a parabolic wire (equation $x^2 = ay$) with its axis vertical and vertex directed downward as in figure. If the coefficient of friction is μ , the highest distance above the x -axis at which the particle will be in equilibrium is



(A) μa

(B) $\mu^2 a$

(C) $\frac{1}{4} \mu^2 a$

(D) $\frac{1}{2} \mu a$

----- Rough Work -----

8. Two stretched wires A and B of the same lengths vibrate independently. If the radius, density and tension of wire A are respectively twice those of wire B, then the fundamental frequency of vibration of A relative to that of B is
 (A) 1 : 1 (B) 1 : 2 (C) 1 : 4 (D) 1 : 8
9. A cylinder with a movable piston contains air under a pressure p_1 and a soap bubble of radius 'r'. The pressure p_2 to which the air should be compressed by slowly pushing the piston into the cylinder for the soap bubble to reduce its radius by half will be: (The surface tension is σ , and the temperature T is maintained constant)
 (A) $\left[8p_1 + \frac{24\sigma}{r}\right]$ (B) $\left[4p_1 + \frac{24\sigma}{r}\right]$ (C) $\left[2p_1 + \frac{24\sigma}{r}\right]$ (D) $\left[2p_1 + \frac{12\sigma}{r}\right]$
10. An aeroplane has to go along straight line from A to B, and back again. The relative speed with respect to wind is V. The wind blows perpendicular to line AB with speed v . The distance between A and B is ℓ . The total time for the round trip is:
 (A) $\frac{2\ell}{\sqrt{V^2 - v^2}}$ (B) $\frac{2v\ell}{V^2 - v^2}$ (C) $\frac{2V\ell}{V^2 - v^2}$ (D) $\frac{2\ell}{\sqrt{V^2 + v^2}}$

----- Rough Work -----

Chemistry (Section – B)

11. 0.1 M solution of KI reacts with excess of H_2SO_4 and KIO_3 solutions. According to equation
 $5\text{I}^- + \text{IO}_3^- + 6\text{H}^+ \rightarrow 3\text{I}_2 + 3\text{H}_2\text{O}$

Identify the correct statements:

- A. 200 mL of KI solution reacts with 0.004 mol of KIO_3
 B. 200 mL of KI solution reacts with 0.006 mol of H_2SO_4
 C. 0.5 L of KI solution produced 0.005 mol of I_2
 D. Equivalent weight of KIO_3 is equal to $\left(\frac{\text{Molecular weight}}{5}\right)$

Choose the correct answer from the options given below:

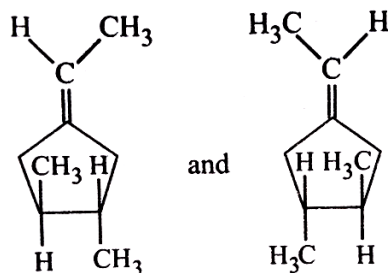
- (A) (A) and (D) only (B) (C) and (D) only
 (C) (B) and (C) only (D) (A) and (B) only

12. 10 moles of A_2 , 15 moles of B_2 and 5 moles of AB are placed in a 2 litre vessel and allowed to come to equilibrium. The final concentration of AB is 10.5 M,
 $\text{A}_2(\text{g}) + \text{B}_2(\text{g}) \rightleftharpoons 2\text{AB}(\text{g})$

Determine the value of equilibrium constant (K_c) for the reaction.

- (A) 25.3 (B) 31.5 (C) 36.3 (D) 40.5

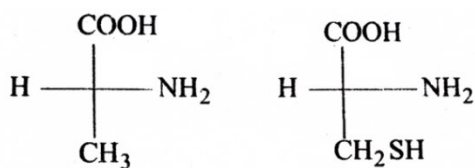
13. The structures given below are:



- (A) Enantiomers (B) Diastereomers (C) Geometrical isomers (D) Homomers

----- Rough Work -----

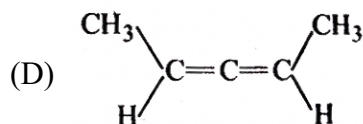
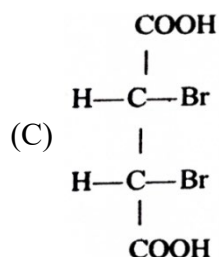
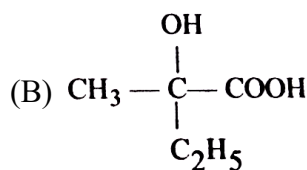
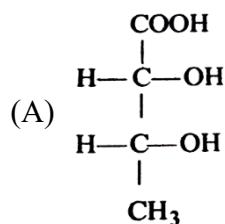
14. A sample of NaClO_3 is converted by heat to NaCl with a loss of 0.16 g of oxygen. The residue is dissolved in water and precipitated as AgCl . The mass of AgCl (in g) obtained will be:
(Given: Molar mass of $\text{AgCl} = 143.5 \text{ g mol}^{-1}$)
(A) 0.35 (B) 0.54 (C) 0.41 (D) 0.48
15. A piston filled with 0.04 mol of an ideal gas expands reversibly from 50.0 mL to 375 mL at a constant temperature of 37°C . As it does so, it absorbs 208 J of heat. The values of q and w for the process will be
($R = 8.314 \text{ J/mol K}$) ($\ln 7.5 = 2.01$)
(A) $q = -208 \text{ J}, w = +208 \text{ J}$ (B) $q = +208 \text{ J}, w = +208 \text{ J}$
(C) $q = +208 \text{ J}, w = -208 \text{ J}$ (D) $q = -208 \text{ J}, w = -208 \text{ J}$
16. The correct absolute configuration assigned for compound (I) and (II) respectively is:



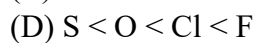
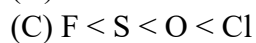
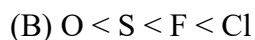
- (A) R, R (B) R, S (C) S, S (D) S, R

----- Rough Work -----

17. Which among the following compounds will be dissymmetric but not asymmetric?



18. Which of the following represents the correct order of increasing electron gain enthalpy with negative sign for the elements O, S, F and Cl?



----- Rough Work -----

19. Given below are two statements:

Statement – I: Along the period, the chemical reactivity of the element gradually increases from group 1 to group 18.

Statement – II: The nature of oxides formed by group 1 element is basic while that of group 17 elements is acidic.

In the light of above statements, choose the most appropriate from the questions given below:

- (A) Both statement I and Statement II are true.
- (B) Statement I is true but Statement II is false.
- (C) Statement I is false but Statement II is true.
- (D) Both Statement I and Statement II is false.

20. 20 mL of 0.1M NaOH is added to 50 mL of 0.1M acetic acid solution. The pH of the resulting solution is $__ \times 10^{-2}$. (Nearest integer)

Given: $\text{pK}^a (\text{CH}_3 \text{COOH}) = 4.76$

$\log 2 = 0.30$

$\log 3 = 0.48$

- (A) 458 (B) 478 (C) 468 (D) 448

----- *Rough Work* -----

Math (Section – C)

21. The angle of elevation of the top of a vertical pole when observed from each vertex of a regular hexagon is $\pi/3$. If the area of the circle circumscribing the hexagon be A metre² then the area of the hexagon is
 (A) $\frac{3\sqrt{3}}{8} A$ metre² (B) $\frac{\sqrt{3}}{\pi} A$ metre² (C) $\frac{3\sqrt{3}}{4\pi} A$ metre² (D) $\frac{3\sqrt{3}}{2\pi} A$ metre²
22. Let $i^2 = -1$. Then
 $\left(i^{10} - \frac{1}{i^{11}}\right) + \left(i^{11} - \frac{1}{i^{12}}\right) + \left(i^{12} - \frac{1}{i^{13}}\right) + \left(i^{13} - \frac{1}{i^{14}}\right) + \left(i^{14} + \frac{1}{i^{15}}\right) =$
 (A) $-1 + i$ (B) $-1 - i$ (C) $1 + i$ (D) $-i$ (E) i
23. If 2 and 6 are the roots of the equation $ax^2 + bx + 1 = 0$, then the quadratic equation, whose roots are $\frac{1}{2a+b}$ and $\frac{1}{6a+b}$, is
 (A) $2x^2 + 11x + 12 = 0$ (B) $x^2 + 8x + 12 = 0$
 (C) $4x^2 + 14x + 12 = 0$ (D) $x^2 + 10x + 16 = 0$

----- Rough Work -----

24. On the occasion of Dipawali festival, each student of a class sends greeting cards to others. If there are 20 students in the class, the number of cards sent by students is
(A) ${}^{20}C_2$ (B) ${}^{20}P_2 \times 2$ (C) $2 \times {}^{20}C_2$ (D) $2 \times {}^{20}P_2$
25. If the coefficients of x^7 in $\left(ax^2 + \frac{1}{2bx}\right)^{11}$ and x^{-7} in $\left(ax - \frac{1}{3bx^2}\right)^{11}$ are equal, then
(A) $64ab = 243$ (B) $729ab = 32$ (C) $32ab = 729$ (D) $243ab = 64$
26. If $a_1, a_2, a_3, \dots$ and $b_1, b_2, b_3, \dots$ are in A.P., and $a_1 = 2, a_{10} = 3, a_1b_1 = 1 = a_{10}b_{10}$, then a_4b_4 is equal to
(A) $\frac{35}{27}$ (B) 1 (C) $\frac{27}{28}$ (D) $\frac{28}{27}$
27. If the straight line $2x - 3y + 17 = 0$ is perpendicular to the line passing through the points $(7, 17)$ and $(15, \beta)$, then β equals
(A) -5 (B) 29 (C) 5 (D) -29

----- Rough Work -----

28. Locus of midpoints of the chords of contact of $x^2 + y^2 = 2$ from the points on the line $3x + 4y = 10$ is a circle with centre P . If O be the origin, the OP is equal to
(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) 1
29. The number of common chords of the parabolas $x = y^2 - 6y + 11$ and $y = x^2 - 6x + 11$ are:
(A) 1 (B) 2 (C) 4 (D) 6
30. The distance between the foci of a hyperbola is 16 and its eccentricity is $\sqrt{2}$. Its equation is
(A) $2x^2 - 3y^2 = 7$ (B) $x^2 - y^2 = 32$
(C) $y^2 - x^2 = 32$ (D) $\frac{x^2}{4} - \frac{y^2}{9} = 1$

----- *Rough Work* -----